



{In Archive} EPA Additional 40 & 41 and MDNR 20 - Uranium Cleanup Level

Paul Rosasco

to:

Dan Gravatt, 'Muenks, Shawn', Rich Kapuscinski

04/16/2011 12:45 PM

Cc:

"Merrigan, Jessie", "Whitby, Kathleen", VWarren, "Charlotte Neitzel", "Dan Feezor",
"Mike Bollenbacher", "Bob Jelinek"

Hide Details

From: "Paul Rosasco" <paulrosasco@emsidenver.com> Sort List...

To: Dan Gravatt/R7/USEPA/US@EPA, "Muenks, Shawn" <shawn.muenks@dnr.mo.gov>,
Rich Kapuscinski/DC/USEPA/US@EPA,

Cc: "Merrigan, Jessie" <JMerrigan@LathropGage.com>, "Whitby, Kathleen"
<kwhitby@spencerfane.com>, <VWarren@republicservices.com>, "Charlotte Neitzel"
<Charlotte.Neitzel@hro.com>, "Dan Feezor" <dfeezor@feezorengineering.com>, "Mike
Bollenbacher" <mikeb@auxier.com>, "Bob Jelinek" <bobjelinek@emsidenver.com>

Archive: This message is being viewed in an archive.

1 Attachment



EPA Addl 40 & 41 and MDNR 20 - Uranium Cleanup Level.doc

Please see the attached file.

0714

40440660

3.0



Superfund

0001

EPA Additional Comments Nos. 40 and 41 and MDNR Section-Specific Comment No. 20 – Uranium Cleanup Level

Comments

EPA Additional Comment No. 40

40. Page 9: The risk-based cleanup level for uranium should not be above background. This is inconsistent with EPA's Role of Background policy. The risk based cleanup level should be expressed as a single concentration which includes background.

EPA Additional Comment No. 41

41. Page 9: To comply with EPA policy, cleanup levels for uranium should be expressed both in terms of mass for total uranium non cancer risk, and activity per uranium isotopes for cancer risk. The non-cancer risk-based level of total uranium should be stated, along with a concise comparison to the cancer-based level and a declaration of which is lower and governs the cleanup.

MDNR Section-Specific Comment No. 20

- 20.) Section 2.2.2 Cleanup Levels, page 9 - The last sentence of the first paragraph states, "Additional discussion regarding the development of the uranium remediation level is presented in the SFS Work Plan." As stated in previous comments on the SFS Work Plan, the Department would like to see a detailed risk calculation of the uranium cleanup level of 50 pCi/g included in this SFS. It is the Department's understanding that the uranium cleanup level is a risk-based value and that background concentrations should not be added to it to attain a cleanup goal.

Discussion

As suggested in EPA's May 9, 2010 letter commenting on the Draft SFS Work Plan and EPA's subsequent May 21, 2010 letter regarding MDNR's comments on the Draft SFS Work Plan, the cleanup level for uranium is based on the cleanup criteria for unrestricted use and unlimited exposure established for the North St. Louis County FUSRAP sites. This cleanup level is 50 pCi/g above background for U-238 calculated using U-238 as a surrogate for total uranium. As indicated in the EPA letters referenced above, the basis for this cleanup level is described in Section 2.8.2 – Derivation of Remediation Goals of the ROD for the North St. Louis County sites (USACE, 2005), and in the St. Louis Airport Site (SLAPS) Record of Decision (EPA, 2005).

Review of these documents indicates that the cleanup level for U-238 (as a surrogate for total uranium) at these sites was defined to be 50 pCi/g above background. Consequently, the EPA-approved SFS Work Plan indicated that for purposes of the SFS, a uranium remediation goal of 50 pCi/g above background would be used. As such, this cleanup value was presented and used in the Draft SFS report. In response to the comment, although derivation of the cleanup value will include incorporation of background concentrations, the actual cleanup values presented in the revised SFS will be single values that incorporate background. In the case of uranium, the cleanup level will be identified as 54.5 pCi/g for total uranium.

EPA's prior non-carcinogenic screening level for uranium was 620 mg/kg. This value was used in the evaluation of residual risks included in the draft SFS report. Subsequent to issuance of the draft SFS report, EPA revised the non-carcinogenic screening level. EPA's current non-carcinogenic screening level for uranium is 3,100 mg/kg (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/).

Of the isotopes of natural uranium, uranium-238 accounts for more than 99 percent of the mass of uranium. The mass concentration of uranium can be calculated by dividing the uranium-238 activity level in picocuries per gram (pCi/g) by the specific activity of 0.336 pCi/μg, resulting in a mass concentration of mg of uranium per kg soil (mg/kg). Based on the natural isotopic abundance of uranium-238, almost half of the total activity (~23.9 pCi/g) of naturally occurring uranium is attributable to the radioactive decay of uranium-238. Using the method described in the Baseline Risk Assessment, the mass concentration corresponding to 50 pCi/g of total uranium (U_{tot}) may be calculated as:

$$\begin{aligned} &= 50 \text{ (pCi U}_{\text{tot}} \text{ / g soil)} \times 23.9 \text{ (pCi U-238)} / 50 \text{ (pCi U}_{\text{tot}} \text{ / 0.336 } \mu\text{g U}_{\text{tot}} \text{ / pCi U-238)} \\ &= 71.1 \text{ ug/g soil} \approx 71 \text{ mg/kg soil.} \end{aligned}$$

Since the non-carcinogenic screening level for elemental uranium is 3,100 mg/kg, at a mass concentration of 71 mg/kg in soil, the hazard quotient calculated for this mass concentration will be < 1 and therefore will not require remediation. Consequently, the cleanup level of 54.5 pCi/g derived from the North St. Louis County sites based on carcinogenic risks represents the more conservative cleanup target.

EPA's preliminary remediation goal (PRG) risk calculator was used to calculate risks to selected receptors from surface deposits of uranium-bearing soil. The following table contains the information necessary to calculate risks from 50 pCi/g of uranium. The first column lists the three isotopes that make up uranium in nature. The second column lists the activity concentration of each isotope found in 50 pCi/g of natural uranium in soil. The third column lists the PRGs, which are the soil concentrations that EPA's PRG risk calculator generates for their default outdoor worker scenario (10^{-6} risk). The last column contains the risk from the activity listed in column 2. The calculated radiogenic risk from soil containing 50 pCi/g of natural uranium is presented as the last entry in the last column (1.5×10^{-5}).

Calculated Risks to Outdoor Workers from 50 pCi/g Natural Uranium				
	Activity	PRGs	Unit Risk	Risk
Isotope	(pCi/g soil)	(pCi/g soil/10⁻⁶ risk)	[risk/(pCi/g soil)]	(risk/50 pCi/g)
U-234	25.0	3.23 x 10 ⁺¹	3.10 x 10 ⁻⁸	7.8 x 10 ⁻⁷
U-235+D	1.1	3.43 x 10 ⁺¹	2.92 x 10 ⁻⁸	3.2 x 10 ⁻⁸
U-238+D	23.9	1.65 x 10 ⁺⁰	6.06 x 10 ⁻⁷	1.4 x 10 ⁻⁵
U_{nat, total}	50	na	na	1.5 x 10⁻⁵

nc = Not calculated

As indicated in EPA's January 24, 2011 letter regarding MDNR comments on the Draft SFS report in response to MDNR Section-Specific comment No. 20, the SFS will note that the detailed risk calculations for the uranium cleanup level of 54.5 pCi/g requested by MDNR are available in Section 2.1.2 of the Record of Decision for the St. Louis Airport site and need not be re-stated in the SFS for West Lake Landfill. Discussion of background levels raised by this comment is addressed elsewhere in response to other comments raised by MDNR.

SFS Text Revisions

Per the EPA-approved SFS Work Plan and as described in the SLAPS and North St. Louis County Sites RODs, the cleanup level for uranium to be used in the SFS will be 54.5 pCi/g. Per EPA's January 24, 2011 letter, the basis for using the 50 pCi/g above background value as presented in the SLAPS and North St. Louis County Sites RODs will not be repeated in the revised SFS report.

In response to EPA Additional Comment No. 41, the following language will be added to the end of discussion of the uranium cleanup level:

A remediation goal of 50 pCi/g is equivalent to a mass-based uranium concentration of 71 mg/kg. EPA's current non-carcinogenic screening level for uranium is 3,100 mg/kg (http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/). Consequently, cleanup of uranium to 50 pCi/g plus background should not pose any non-carcinogenic risks. Therefore, the cleanup level of 54.5 pCi/g derived for the SLAPS and the North St. Louis sites based on carcinogenic risks represents the more conservative cleanup target.